IN THE CLAIMS

1. (Currently Amended) A wavelength-swept pulse laser~~, producing~~ structured to produce a mode-locked short pulsed output, the wavelength-swept pulse laser ~~whose center wavelength continuously varies with time,~~ comprising:

a resonator having an optical path, the optical path including ~~therein~~ an optical gain medium capable of amplifying light over a ~~wide~~ range of ~~wavelength band,~~ wavelengths,

a wavelength tunable filter with a ~~minimum loss~~ center wavelength ~~range~~, and a non-linear medium with a ~~light intensity dependent~~ refractive index that is light intensity dependent;

an optical pump ~~means~~ for ~~the~~ creating a population inversion ~~of said~~ in the optical gain medium; and

a filter modulation signal ~~generating means for continuously varying the minimum loss center wavelength range of said~~ generator coupled to the wavelength tunable filter ~~with time~~, the wavelength-swept laser structured to mode lock the short pulsed output by continuously varying the center wavelength of the wavelength tunable filter and by self phase modulation of the light in the non-linear medium.

~~whereby the laser output is a short mode-locked pulse type and its center wavelength varies continuously with time.~~

2. (Currently Amended) The laser of claim 1, ~~wherein said~~ the optical gain medium ~~is any one~~ selected from the group consisting of a rare earth ion doped single mode optical fiber, a rare earth ion doped single mode planar waveguide, a titanium doped sapphire crystal, and a Nd-YVO_4 crystal.

3. (Currently Amended) The laser of claim 1, ~~wherein said~~ the optical gain medium ~~is~~ comprising a semiconductor amplifier.

4. (Currently Amended) The laser of claim 3, ~~wherein~~ the optical pump ~~means is~~ comprising an electrical current generator ~~which generates~~ structured to generate a current whose intensity modulation frequency is equal to an integral multiple of the intermode spacing of longitudinal resonator modes ~~or some integral multiple of the spacing~~, which results the gain constant modulation of ~~said~~ the semiconductor amplifier, whereby the

wavelength-swept pulse laser generates mode-locked optical pulses and its pulse generation timing is appropriately adjusted.

5. (Currently Amended) The laser of claim 1, ~~wherein said~~ the wavelength tunable filter ~~is any one~~ selected from the group consisting of an acousto-optic wavelength tunable filter, a Fabry-Perot interferometric wavelength tunable filter, and a reflective diffraction grating with ~~varying~~ a variable reflective center wavelength ~~depending~~ that depends upon ~~the~~ a rotation of the grating.

6. (Currently Amended) The laser of claim 1, ~~wherein said~~ the wavelength tunable filter ~~comprises:~~ comprising:

a beam ~~deflection means~~ deflector for controlling the direction of propagating light; and

an optical device capable of producing low optical loss only within a determined frequency range when the light ~~transmitted or reflected depending on the controlled beam direction~~ is coupled to the resonator by the beam deflector.

7-8. (Cancelled)

9. (Currently Amended) The laser of claim 1, ~~wherein said~~ the non-linear medium ~~includes~~ comprising a length of single mode optical fiber.

10. (Currently Amended) The laser of claim 1, ~~wherein said~~ the non-linear medium ~~is~~ comprising a semiconductor saturable absorber ~~to enhance~~ that enhances the self-phase modulation effect, whereby ~~said~~ the non-linear medium helps the generation of mode-locked optical pulses.

11. (Currently Amended) The laser of claim 1, ~~wherein said~~ the optical gain medium ~~is comprised of~~ comprising one optical device that also acts as a non-linear medium.

12. (Original) The laser of claim 11, ~~wherein said~~ the optical gain medium ~~is~~ selected from the group consisting of a rare earth ion doped optical fiber with ~~much~~ a non-linear refractive index change ~~or~~ and a titanium doped sapphire crystal.

13-14. (Cancelled)

15. (Currently Amended) A method of producing mode-locked laser ~~pulse~~ pulses ~~generation,~~ comprising ~~the steps of~~:

~~preparing within~~ providing a resonator having an optical path, the optical path including an optical gain medium capable of amplifying light over a range of wavelengths, a wavelength tunable filter with a center wavelength whose loss is minimum thereabout, and a non-linear medium with ~~light intensity dependent~~ a refractive index that varies according to a light intensity;

transmitting optical pulses in ~~said~~ the non-linear medium to broaden the spectrum of the optical pulses by ~~inducing~~ self-phase modulation~~;~~ and, concurrently, continuously varying the center wavelength of the ~~tuning said~~ wavelength tunable filter ~~so that the minimum loss wavelength range of the tunable filter can continuously vary with time;~~ to mode-lock the laser pulses; and

amplifying ~~only selected portions of the broadened optical pulses, the wavelength spectrum of the selected portions being placed around the minimum loss wavelength range.~~ components of the optical pulses around the center wavelengths.

16. (Currently Amended) The method of claim 15, ~~wherein, in the step of tuning the wavelength tunable filter, the wavelength tunable filer is tuned~~ wherein continuously varying the center wavelength of the wavelength tunable filter comprises continuously tuning the wavelength tunable filter so that a variation speed V of the center wavelength of the wavelength tunable filter is substantially greater than a constant critical speed ~~Vc(=ln(r)Δ-4/b2)~~ $Vc = [\ln(r) * \Delta^4]/b^2$ for most of a wavelength sweeping time, whereby a plurality of resonator modes can simultaneously oscillate, where ~~V is the variation speed of the minimum loss center wavelength of the wavelength tunable filter, and the constant critical speed Vc is defined as ln(r)Δ-4/b2, and~~ Δ is the wavelength spacing between resonator modes, ~~and~~ b is the full width at half maximum, and ~~ln(r) is the natural logarithm of the ratio~~ r is the ratio of the maximum to the minimum light intensity for each mode.

17. (Currently Amended) The method of claim 15, ~~wherein~~ further comprising:
applying an electrical signal to ~~said~~ the wavelength tunable filter, and
~~the frequency and/or voltage of the electrical signal~~ continuously and periodically

~~sweeping~~ sweeping, over a predetermined ~~range.~~ range, at least one selected from the group consisting of a frequency of the electrical signal and a voltage of the electrical signal.

18. (Currently Amended) The method of claim 17, ~~wherein~~ further comprising superimposing an electrical pulse whose duration time is shorter than the resonator roundtrip time of light over the front portion of each repeating waveform of the electrical signal, thereby tuning pulse generation timing to the electrical pulse as well as helping the generation of optical pulses.

19-22. (Cancelled)

23. (New) A laser comprising:

a resonator having an optical path including therein an optical gain medium capable of amplifying light over a wavelength band, a wavelength tunable filter with a minimum loss center wavelength range, and a non-linear medium with a light intensity dependent refractive index;

an optical pump for creating a population inversion in the optical gain medium; and

a filter modulation signal generator coupled to the wavelength tunable filter, the filter modulation signal generator structured to produce a wavelength-swept laser output of a short mode-locked pulse type by continuously varying the minimum loss center wavelength range of the wavelength tunable filter.

24. (New) The laser of claim 23, the optical gain medium selected from the group consisting of a rare earth ion doped single mode optical fiber, a rare earth ion doped single mode planar waveguide, a titanium doped sapphire crystal, and a Nd-YVO_4 crystal.

25. (New) The laser of claim 23, the optical gain medium comprising a semiconductor amplifier.

26. (New) The laser of claim 25, the optical pump comprising an electrical current generator structured to generate a current whose intensity modulation frequency is equal to an integral multiple of the intermode spacing of longitudinal resonator modes.

27. (New) The laser of claim 23, the wavelength tunable filter selected from the group consisting of an acousto-optic wavelength tunable filter, a Fabry-Perot interferometric wavelength tunable filter, and a reflective diffraction grating with a variable reflective center wavelength that depends upon a rotation of the grating.

28. (New) The laser of claim 23, the wavelength tunable filter comprising:

a beam deflector for controlling the direction of propagating light; and

an optical device capable of producing low optical loss only within a determined frequency range when the light is coupled to the resonator by the beam deflector.

29. (New) The laser of claim 23, the non-linear medium comprising a length of single mode optical fiber.

30. (New) The laser of claim 23, the non-linear medium comprising a semiconductor saturable absorber that enhances the self-phase modulation effect, whereby said non-linear medium helps the generation of mode-locked optical pulses.

31. (New) The laser of claim 23, the optical gain medium comprising one optical device that also acts as a non-linear medium.

32. (New) The laser of claim 31, the optical gain medium selected from the group consisting of a rare earth ion doped optical fiber with a non-linear refractive index change and a titanium doped sapphire crystal.